

## CHAPTER 5.1

Electricity	Describes phenomena caused by the difference between negative and positive charges
Electrical charge	is a property of protons and electrons. A proton carries a positive charge, while an electron carries a negative charge
Negatively charged body	contains more electrons than protons
Positively charged body	contains fewer electrons than protons
Elementary charge	is the charge carried by a single electron or proton
The coulomb	is the unit of measurement for the quantity of electrical charge. One coulomb is equal to the charge of $6.25 \times 10^{18}$ electrons or protons.
attraction	force created between a charged object and neutral object and the force created between objects of opposite charge.
repulsion	force created between objects of the same charge
electrical force	forces of attraction or repulsion
Law of conservation of charge	charges are transferred not created or destroyed ONLY ELECTRONS are transferred
Charging	creating an imbalance of electrons and protons ONLY ELECTRONS are transferred
Conductor	substance that permits the free flow of electrons
Insulator	substance that impedes the free flow of electrons.
"Semiconductors"	variable conductivity permitted - substances are referred to as metalloids

### Static Electricity Activity

	Vinyl (-)	Acetate (+)	String (neutral)
Vinyl (-)	repels	attracts	attracts
Acetate (+)	attracts	repels	attracts

String (neutral)	attracts	attracts	no effect
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#### Discussion

- 1 Like charges? repel each other
- 2 Opposite charges? attract
- 3 Either charge plus neutral? attracts
- 4 Nothing happens to neutral objects.

## CHAPTER 5.2

Static Electricity	Describes the phenomena related to electrical charges at rest
Charging an object	creating an imbalance of electrons in an object
Charging by conduction	Touching a charged object to a neutral object. <ul style="list-style-type: none"> <li>Electrons flow from one object to the other to even out the charge</li> </ul>
Charging by induction	No touching. Bring a charged object near a neutral object. <ul style="list-style-type: none"> <li>Electrons are pushed away from a negative charge or pulled towards a positive charge</li> </ul>
Charging by Friction	Rubbing two neutral objects together. <ul style="list-style-type: none"> <li>electrons from the substance/object from lower on triboelectric scale will transfer to the object higher on the scale.</li> </ul>

## CHAPTER 5.3

Dynamic Electricity	electrical charges in motion - around a loop												
Electric Current	orderly flow (follows the path of least resistance) of negative charges carried by electrons.												
The Conventional Current Direction	Goes from + to - (positive to negative) <ul style="list-style-type: none"><li>● outdated and misleading because electrons flow in the opposite direction (ARGH!)</li></ul>												
Current intensity	the number of charges (electrons) that pass a certain point every second. <ul style="list-style-type: none"><li>● Ammeter is used to measure this</li><li>● MUST BE CONNECTED ***IN SERIES***</li></ul>												
Ammeter	used to measure the current of a circuit <ul style="list-style-type: none"><li>● connected in series (<b>forces all electrons through it</b>)</li></ul>												
$I=q/\Delta t$	<table><tr><th>Symbol</th><th>Name</th><th>Unit</th></tr><tr><td>I</td><td>Current (AKA intensity)</td><td>A (amperes)</td></tr><tr><td>q</td><td>Quantity of charge (AKA # of electrons)</td><td>C (Coulombs)</td></tr><tr><td><math>\Delta t</math></td><td>Change in time</td><td>S (seconds)</td></tr></table>	Symbol	Name	Unit	I	Current (AKA intensity)	A (amperes)	q	Quantity of charge (AKA # of electrons)	C (Coulombs)	$\Delta t$	Change in time	S (seconds)
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I	Current (AKA intensity)	A (amperes)											
q	Quantity of charge (AKA # of electrons)	C (Coulombs)											
$\Delta t$	Change in time	S (seconds)											
Potential Difference	amount of energy transferred between two points in an electrical circuit. <ul style="list-style-type: none"><li>● Voltmeter used to measure this</li><li>● CONNECTED ***IN PARALLEL***</li></ul>												
Resistance	-Any part of an electrical circuit that transforms electrical energy <ul style="list-style-type: none"><li>● to heat, motion etc</li></ul> -slows the flow of the current.												
Conductance	the ability of a substance to transmit electricity <ul style="list-style-type: none"><li>● a conductor's conductance is enhanced if</li></ul>												

	<ul style="list-style-type: none"><li>it's short, it's thick and it's cold</li></ul>												
Voltmeter	Used to measure the voltage drop across a resistor <ul style="list-style-type: none"><li>measures difference in energy of electrons before and after resistance (one or more resistors)</li><li>connected in parallel</li></ul>												
Ohm's Law (include EQUATION!!!)  V=IR	<table><tr><th>Symbol</th><th>Name</th><th>Unit</th></tr><tr><td>V</td><td>Potential difference or Voltage</td><td>(V) Volts</td></tr><tr><td>I</td><td>Current or Intensity</td><td>(A) Amps</td></tr><tr><td>R</td><td>Resistace</td><td>(Ω) Ohms</td></tr></table>	Symbol	Name	Unit	V	Potential difference or Voltage	(V) Volts	I	Current or Intensity	(A) Amps	R	Resistace	(Ω) Ohms
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Power	Power is the amount of work done per unit time												
Electrical Power $P_e=W/\Delta t$	<table><tr><th>Symbol</th><th>Name</th><th>Unit</th></tr><tr><td><math>P_e</math></td><td>Power and sometimes wattage</td><td>Watts (W)</td></tr><tr><td>W</td><td>Work</td><td>Joules (J)</td></tr><tr><td><math>\Delta t</math></td><td>Change in time</td><td>Seconds (s)</td></tr></table>	Symbol	Name	Unit	$P_e$	Power and sometimes wattage	Watts (W)	W	Work	Joules (J)	$\Delta t$	Change in time	Seconds (s)
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The same equation but with bigger numbers  $E=Pe\Delta t$	<b>E = the electrical energy in joules (J) or kilowatt-hours kWh</b>  <table><tr><th>Symbol</th><th>Name</th><th>Unit</th></tr><tr><td><math>P_e</math></td><td>Power</td><td>Kilowatts (kW)</td></tr><tr><td>E</td><td>Energy</td><td>Kilowatt hours (kW/h)</td></tr><tr><td><math>\Delta t</math></td><td>Change in time</td><td>hours (h)</td></tr></table>	Symbol	Name	Unit	$P_e$	Power	Kilowatts (kW)	E	Energy	Kilowatt hours (kW/h)	$\Delta t$	Change in time	hours (h)
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Differentiate between kWh and J	$1\text{kWh} = 1000\text{ W} \times 3600\text{ s} = 3\,600\,000\text{ J}$
Electrical circuit	Electrical charges can flow continuously in a loop. Electrons flow from positive to negative (conventional current)
A series circuit	<ol style="list-style-type: none"> <li>1. components are connected end to end</li> <li>2. only one path for the electrons around the circuit</li> <li>3. the energy available for each resistor decreases as you add a new one (the brightness of each bulb decreases)</li> </ol>
A Parallel circuit	<ol style="list-style-type: none"> <li>1. There's at least one branch in the circuit</li> <li>2. Multiple paths for electrons around circuit</li> <li>3. the energy available to each resistor remains the same.</li> </ol>

## CHAPTER 5.4

### Magnets

Magnetic attraction

Magnetic repulsion

the North Pole

Magnetic field

Chapter 5.5  
Electromagnetism

Magnetization by electricity

Magnetic field of a live wire

Solenoid

Magnetic field of a solenoid

Compare and contrast the two  
Right hand rules

Electromagnets (include 3 ways to increase power)

Charging by magnetism

Electromagnetic induction